OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **PECKER POND,** the program coordinators recommend the following actions. *The following observations are based on a limited amount of data. We recommend increasing sampling frequency if possible, to improve the accuracy of our analyses. Remember, the Franklin Pierce College Water Quality Laboratory in Rindge is now associated with VLAP and is open to volunteers who wish to borrow equipment and bottles.*

FIGURE INTERPRETATION

- Figure 1: These graphs illustrate concentrations of chlorophyll-a in the water column. Algae are microscopic plants that are a natural part of lake ecosystems. Algae contain chlorophyll-a, a pigment necessary for photosynthesis. A measure of chlorophyll-a can indicate the abundance of algae in a lake. The historical data (the bottom graph) show a *variable* in-lake chlorophyll-a trend. The chlorophyll concentration in July was the second lowest Pecker Pond has experienced since joining the VLAP program seven years ago. Concentrations fell below the NH mean reference line, and the dominant algae at this time were diatoms and golden browns. While algae are present in all lakes, an excess amount of any type is not welcomed. Concentrations can increase when there are external and internal sources of phosphorus, which is the nutrient algae depend upon for growth. It's important to continue the education process and keep residents aware of the sources of phosphorus and how it influences lake quality.

- Figure 2: Water clarity is measured by using a Secchi disk. Clarity, or transparency, can be influenced by such things as algae, sediments from erosion, and natural colors of the water. The graphs on this page show historical and current year data. The lower graph shows a *stable* trend in lake transparency. Transparency improved this year and the Secchi disk was seen on the bottom of the pond. The rainy season and weather while sampling did not decrease the clarity of the water this year. The 2000 sampling season was considered to be wet and, therefore, average transparency readings are expected to be slightly lower than last year's readings. Higher amounts of rainfall usually cause more eroding of sediments into the lake and streams, thus decreasing clarity.

- Figure 3: These figures show the amounts of phosphorus in the epilimnion (the upper layer in the lake) and the hypolimnion (the lower layer); the inset graphs show current year data. Phosphorus is the limiting nutrient for plants and algae in New Hampshire waters. Too much phosphorus in a lake can lead to increases in plant growth over time. These graphs show a *fairly stable* trend for in-lake phosphorus levels. The phosphorus concentration in the epilimnion was higher this season, however remained below the NH mean reference line. An increase in rain likely caused phosphorus from the watershed to be washed into the lake therefore raising in-lake concentrations. No sample was collected for the hypolimnion at this time because the lake was not stratified to form an upper and lower water layer. One of the most important approaches to reducing phosphorus levels is educating the public. Humans introduce phosphorus to lakes by several means: fertilizing lawns, septic system failures, and detergents containing phosphates are just a few. Keeping the public aware of ways to reduce the input of phosphorus to lakes means less productivity in the lake in the lake. Contact the VLAP coordinator for tips on educating your lake residents or for ideas on testing your watershed for phosphorus inputs.

OTHER COMMENTS

- In-lake conductivity has remained low over the years (Table 6). Conductivity was particularly low this year, most likely as a result of the excess rains, which tend to dilute and flush pollutants from the surface waters. Conductivity increases often indicate the influence of human activities on surface waters. This stable trend is a positive sign for Pecker Pond. Septic system leachate, agricultural runoff, iron deposits, and road runoff can each influence conductivity readings.

- Pecker Pond was resurveyed in the 2000 season by the DES Biomonitoring Program to look for frog malformations. Out of the 500 frogs collected at Pecker Pond 50 were observed to have a type of malformation. It is still uncertain what the causes might be for malformation; however, with the information gathered at Pecker Pond and throughout New Hampshire we are continually making progress. We would like to resurvey the pond again in 2001. This consistent data will help us to establish a trend in malformations for Pecker Pond, which in turn will help bring us closer to identifying the causes of malformation. We would appreciate it if volunteers would contact DES when the frogs have reached the metamorph stage (all limbs have emerged and some portion of the tail remains). If volunteers would like to help capture and survey the frogs, please contact Angie Archer of the Biomonitoring Program at 271-8800. If you would like to schedule our annual pond visit for the same day please contact the VLAP Coordinator at 271-2658. For more information about studies around the nation, go to www.npwrc.usgs.gov/narcam, the North American Reporting Center for Amphibian Malformities website. For more information about local and statewide malformations, go to www.des.state.nh.us/wmb/biomonitoring, or email the biologists at biomonitoring@des.state.nh.us.

- If this year's sampling events were hindered by lack of time please remember the Franklin Pierce College Water Quality Lab is open at the college in Rindge. This lab was established to reduce the driving time for the VLAP monitors in the southwestern region of the state. This lab will ensure the quality of the analyses, since the time spent driving to the lab is much less than the drive to Concord. We encourage the lake association to utilize this lab next summer for all sampling events (except for our annual visit, of course!). To find out more about the lab, or to pick up bottles and equipment, call Michele Hood, the lab manager, at (603) 899-4384.

- We would like to suggest to the monitors of Pecker Pond that they join the Weed Watchers program. Many of the lakes and ponds in the Rindge area have discovered variable milfoil, an invasive exotic plant species. The Weed Watchers program trains volunteers in plant identification. For more information, contact Amy Smagula, the program coordinator, at (603) 271-2248.

NOTES

- Biologist's Note (7/26/00): Raining while sampling. Secchi disk visible on bottom.

USEFUL RESOURCES

Camp Road Maintenance Manual: A Guide for Landowners. Kennebec Soil and Water Conservation District, 1992. (207) 287-3901

What Can You Do To Prevent Soil Erosion?, WD-BB-30, NHDES Fact Sheet. (603) 271-3503 or www.state.nh.us

Bacteria in Surface Waters, WD-BB-14, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

In Our Backyard. 1994. Terrence Institute, 4 Herbert St., Alexandria, VA. 22305, or call (800) 726-4853.

Handle With Care: Your Guide to Preventing Water Pollution. Terrene Institute, 1991. (703) 661-1582.

Diet for a Small Lake: A New Yorker's Guide to Lake Management. Federation of Lake Associations, Cazenovia, NY, 1990. (315) 655-4760

Through the Looking Glass: A Field Guide to Aquatic Plants. North American Lake Management Society, 1988. (608) 233-2836 or www.nalms.org

2000

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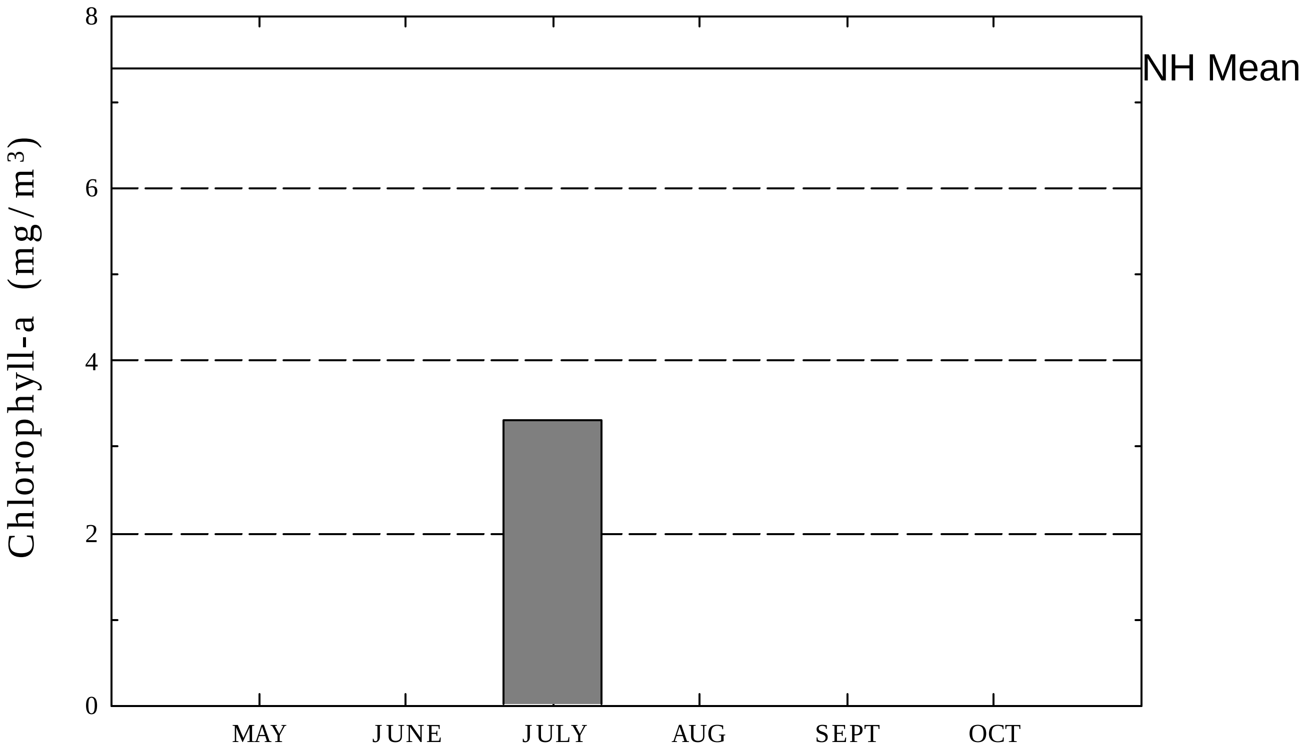
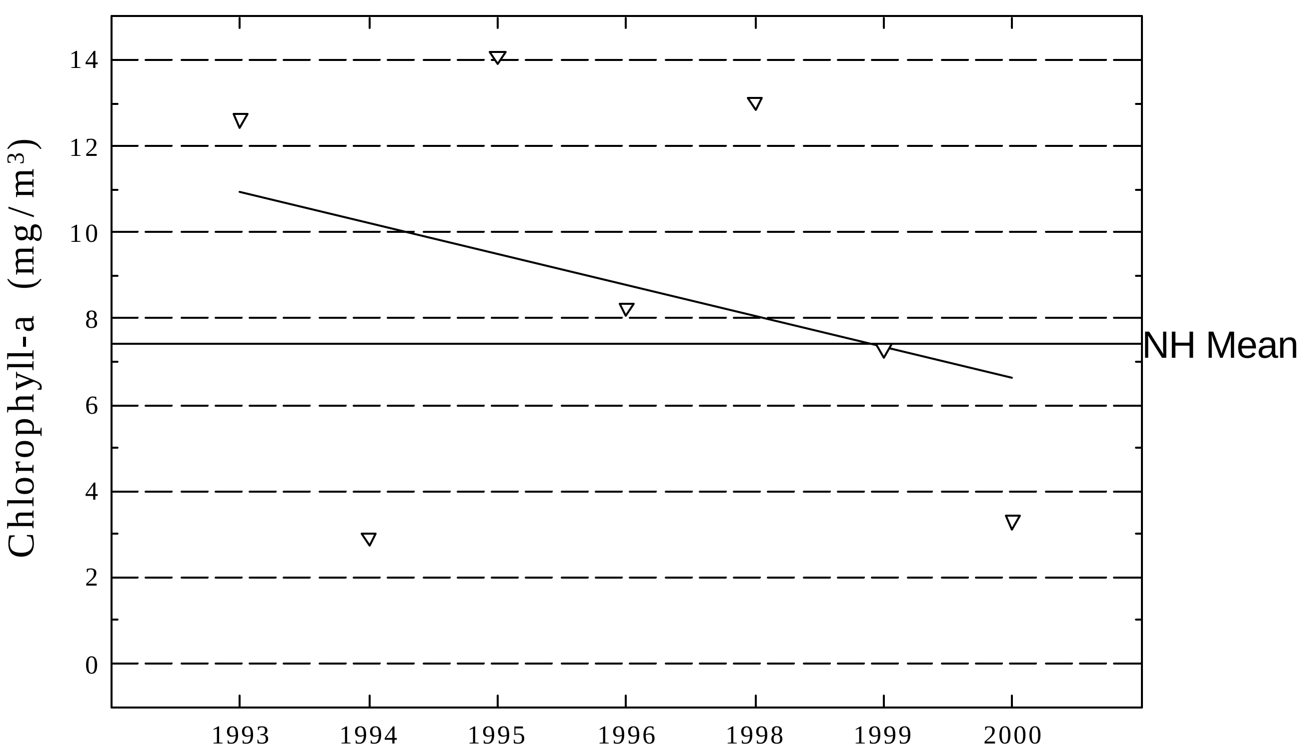
Pecker Pond

Figure 1. Monthly and Historical Chlorophyll-a Results



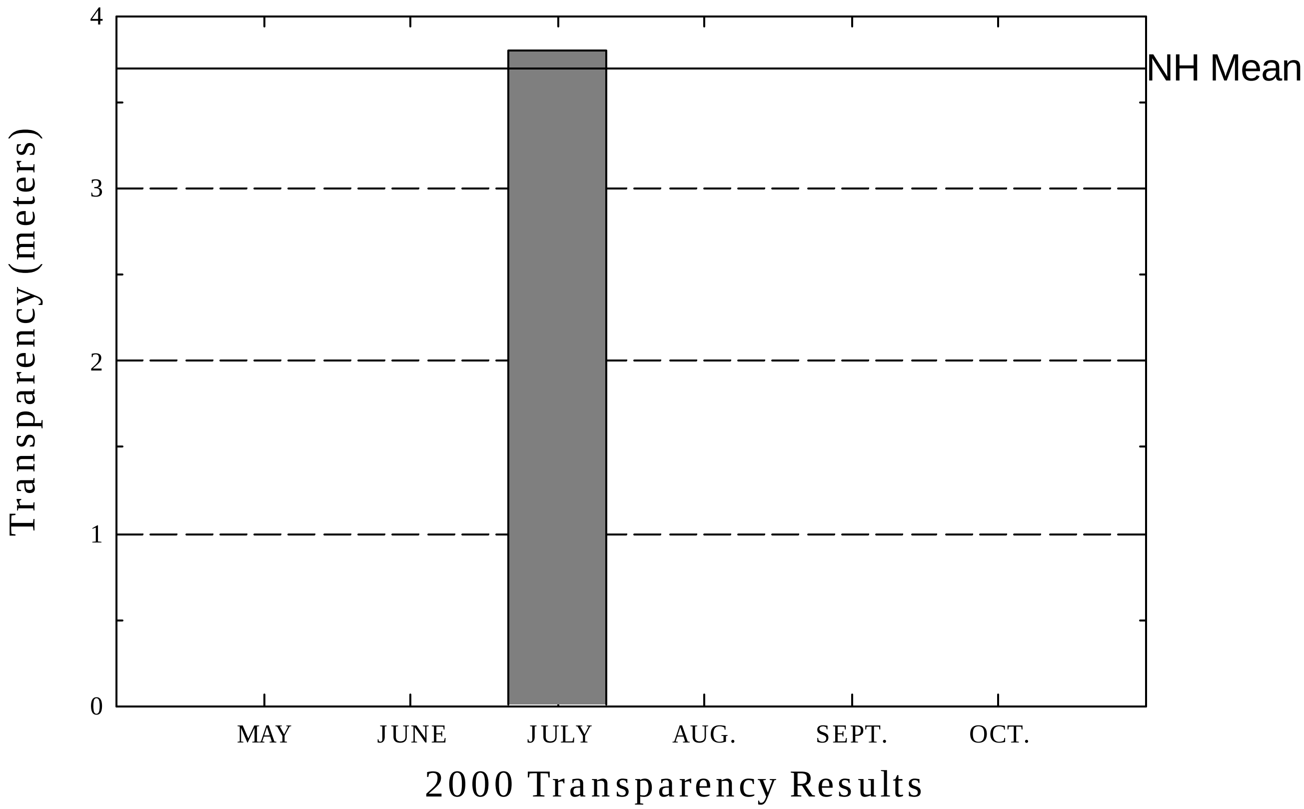
2000 Chlorophyll-a Results

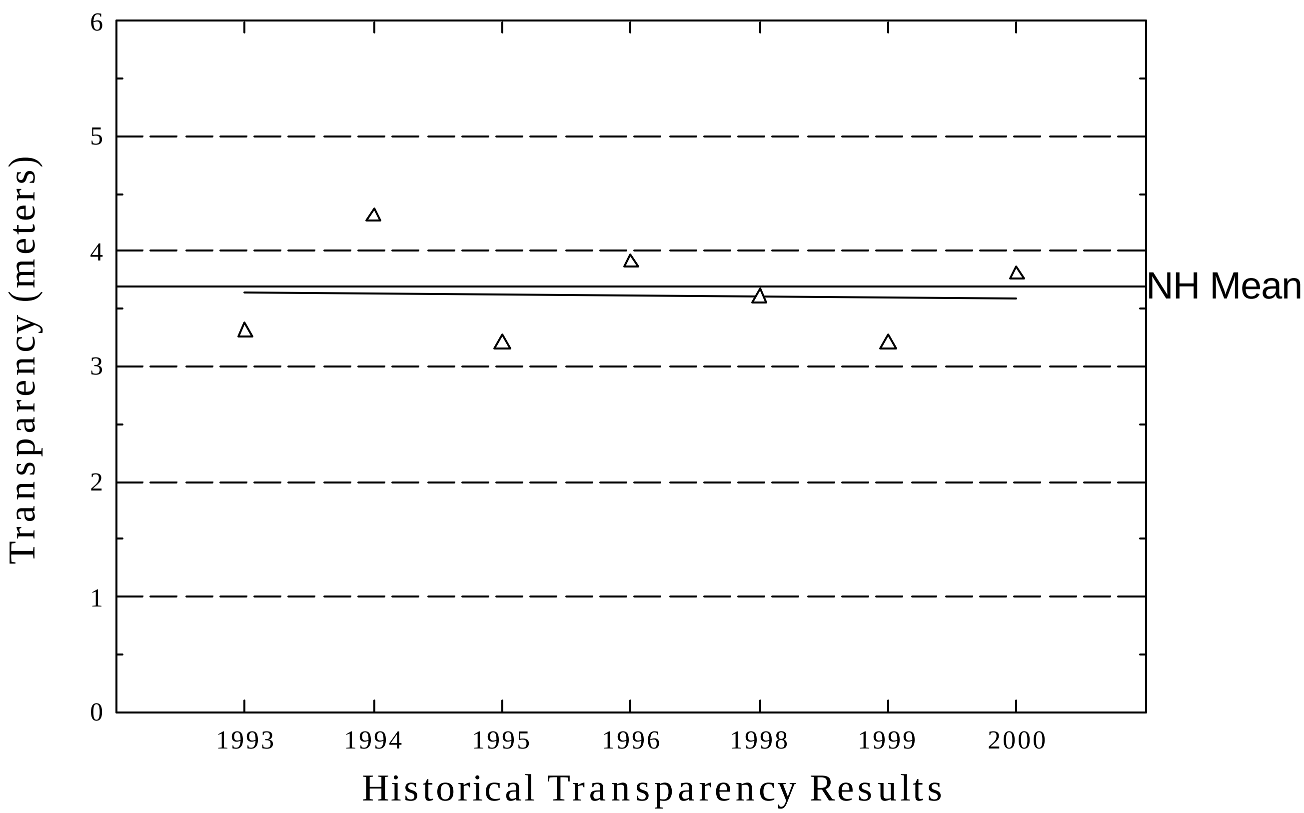


Historical Chlorophyll-a Results

Pecker Pond

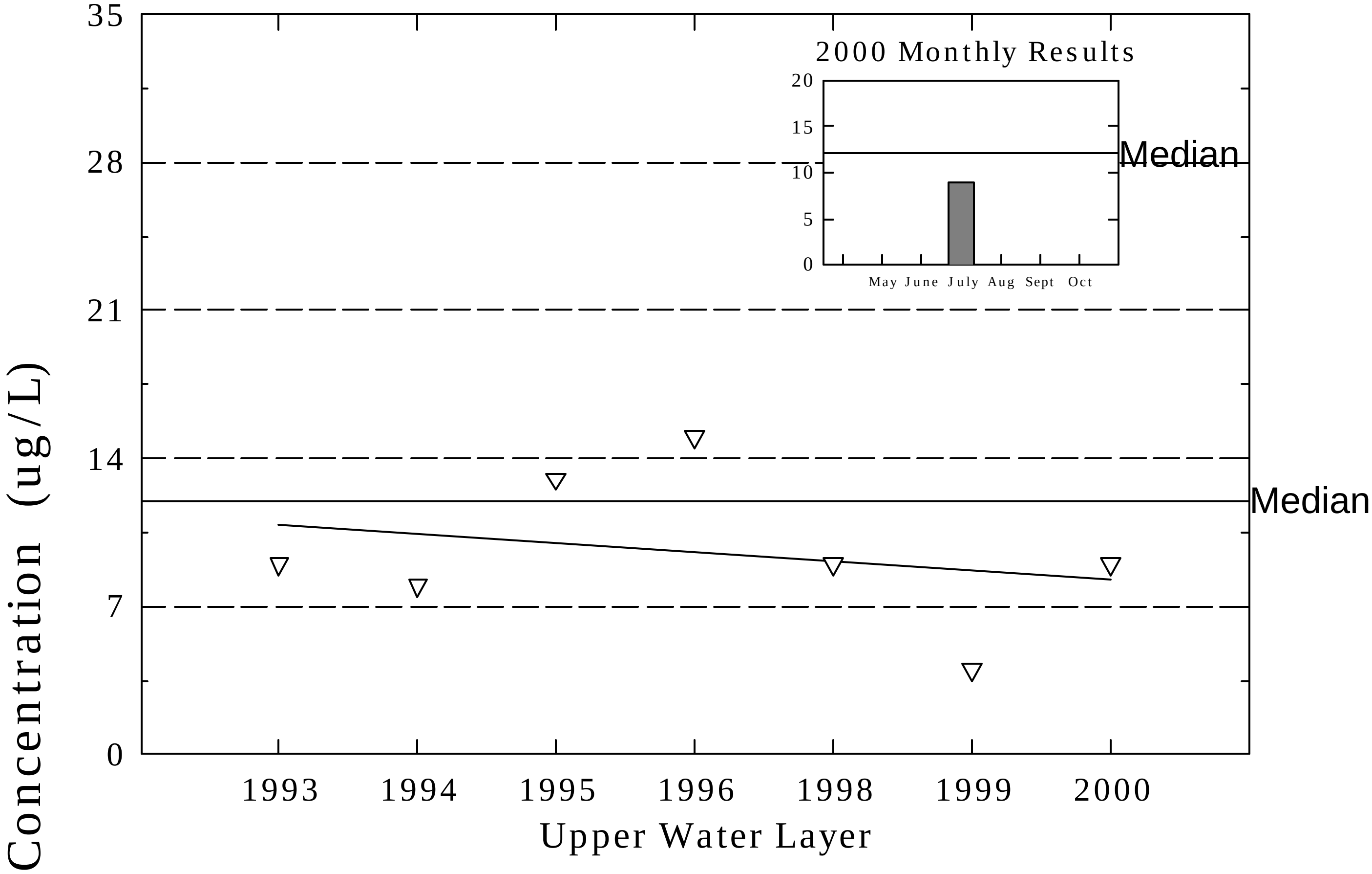
Figure 2. Monthly and Historical Transparency Results





Pecker Pond

Figure 3. Monthly and Historical Total Phosphorus Data.



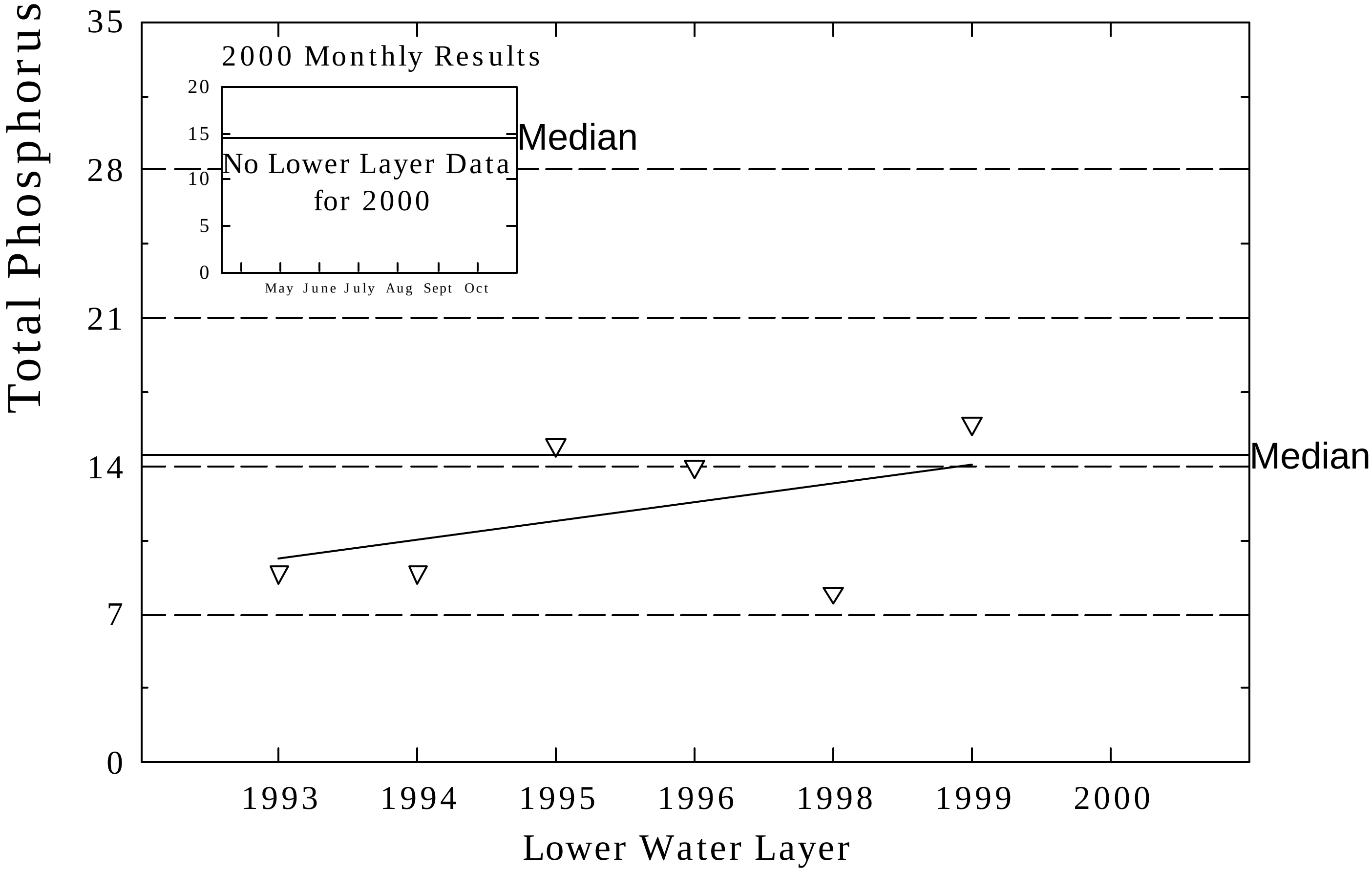


Table 1.

PECKER POND

RINDGE

Chlorophyll-a results (mg/m^3) for current year and historical sampling periods.

Year	Minimum	Maximum	Mean
1993	12.63	12.63	12.63
1994	2.92	2.92	2.92
1995	14.08	14.08	14.08
1996	8.24	8.24	8.24
1998	13.02	27.13	20.07
1999	7.30	7.30	7.30
2000	3.32	3.32	3.32

Table 2.

PECKER POND

RINDGE

Phytoplankton species and relative percent abundance.

Summary for current and historical sampling seasons.

Date of Sample	Species Observed	Relative % Abundance
08 / 25 / 1993	DINOBRYON	98
06 / 07 / 1994	UROGLENOPSIS	85
	ASTERIONELLA	14
08 / 15 / 1995	DINOBRYON	59
	CHRYSOSPHAERELLA	28
	MALLOMONAS	7
08 / 13 / 1996	MALLOMONAS	45
	GYMNODINIUM	25
	RHIZOSOLENIA	8
09 / 08 / 1998	CHRYSOSPHAERELLA	55
	PERIDINIUM	28
	RHIZOSOLENIA	4
09 / 18 / 1998	CHRYSOSPHAERELLA	55
	PERIDINIUM	28
	RHIZOSOLENIA	4
07 / 26 / 1999	PERIDINIUM	54
	MALLOMONAS	17
	DINOBRYON	15
07 / 26 / 2000	RHIZOSOLENIA	26
	MALLOMONAS	21
	PERIDINIUM	15

Table 3.

PECKER POND

RINDGE

Summary of current and historical Secchi Disk transparency results (in meters).

Year	Minimum	Maximum	Mean
1993	3.3	3.3	3.3
1994	4.3	4.3	4.3
1995	3.2	3.2	3.2
1996	3.9	3.9	3.9
1998	3.5	3.6	3.5
1999	3.2	3.2	3.2
2000	3.8	3.8	3.8

Table 4.

PECKER POND
RINDGE

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1993	6.31	6.31	6.31
	1994	5.98	5.98	5.98
	1995	6.31	6.31	6.31
	1996	6.45	6.45	6.45
	1998	6.33	6.33	6.33
	1999	6.00	6.00	6.00
	2000	6.08	6.08	6.08
HYPOLIMNION				
	1993	6.14	6.14	6.14
	1994	5.87	5.87	5.87
	1995	6.14	6.14	6.14
	1996	6.00	6.00	6.00
	1998	5.94	5.94	5.94
	1999	5.95	5.95	5.95
OUTLET				
	1995	6.20	6.20	6.20
	1998	6.08	6.08	6.08
	1999	6.39	6.39	6.39
	2000	5.98	5.98	5.98
SOUTHSIDE BY ROAD				
	1993	6.20	6.20	6.20
	1994	5.93	5.93	5.93
	1996	6.06	6.06	6.06

Table 5.

PECKER POND

RINDGE

Summary of current and historical Acid Neutralizing Capacity.
Values expressed in mg/L as CaCO .

Epilimnetic Values

Year	Minimum	Maximum	Mean
1993	0.90	0.90	0.90
1994	0.80	0.80	0.80
1995	1.50	1.50	1.50
1996	1.60	1.60	1.60
1998	1.20	1.20	1.20
1999	1.30	1.30	1.30
2000	1.30	1.30	1.30

Table 6.

PECKER POND
RINDGE

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1993	22.6	22.6	22.6
	1994	22.0	22.0	22.0
	1995	23.4	23.4	23.4
	1996	22.6	22.6	22.6
	1998	21.0	21.0	21.0
	1999	22.9	22.9	22.9
	2000	21.4	21.4	21.4
HYPOLIMNION				
	1993	22.7	22.7	22.7
	1994	21.9	21.9	21.9
	1995	22.8	22.8	22.8
	1996	22.8	22.8	22.8
	1998	21.3	21.3	21.3
	1999	23.4	23.4	23.4
OUTLET				
	1995	23.0	23.0	23.0
	1998	21.4	21.4	21.4
	1999	22.8	22.8	22.8
	2000	21.3	21.3	21.3
SOUTHSIDE BY ROAD				
	1993	22.3	22.3	22.3
	1994	22.3	22.3	22.3
	1996	22.9	22.9	22.9

Table 8.

PECKER POND
RINDGE

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1993	9	9	9
	1994	8	8	8
	1995	13	13	13
	1996	15	15	15
	1998	9	9	9
	1999	4	4	4
	2000	9	9	9
HYPOLIMNION				
	1993	9	9	9
	1994	9	9	9
	1995	15	15	15
	1996	14	14	14
	1998	8	8	8
	1999	16	16	16
OUTLET				
	1995	6	6	6
	1998	5	5	5
	1999	5	5	5
	2000	5	5	5
SOUTHSIDE BY ROAD				
	1993	9	9	9
	1994	10	10	10
	1996	11	11	11

Table 9.

PECKER POND

RINDGE

Current year dissolved oxygen and temperature data.

Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
July 26, 2000			
0.1	23.0	7.1	83.1
1.0	23.0	7.2	83.4
2.0	23.0	7.1	82.7
3.0	23.0	6.9	80.8

Table 10.

PECKER POND

RINDGE

Historic Hypolimnetic dissolved oxygen and temperature data.

Date	Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
August 25, 1993	4.5	22.0	3.1	35.0
June 7, 1994	4.0	18.0	8.0	85.0
August 15, 1995	4.0	23.0	5.0	58.0
August 13, 1996	4.0	22.0	1.1	13.0
September 18, 1998	3.0	19.8	8.3	88.0
July 26, 1999	4.0	24.7	3.8	46.3
July 26, 2000	3.0	23.0	6.9	80.8

Table 11.

PECKER POND

RINDGE

Summary of current year and historic turbidity sampling.

Results in NTU's.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1998	0.8	0.8	0.8
	1999	0.6	0.6	0.6
	2000	0.4	0.4	0.4
HYPOLIMNION				
	1998	0.5	0.5	0.5
	1999	1.8	1.8	1.8
OUTLET				
	1998	0.6	0.6	0.6
	1999	0.4	0.4	0.4
	2000	0.5	0.5	0.5